NOISE IMPACT ANALYSIS

CHALFANT VALLEY/APN 26-210-37

LSA

March 26, 2004

NOISE IMPACT ANALYSIS

CHALFANT VALLEY/APN 26-210-37

MONO COUNTY, CALIFORNIA

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LSA

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CHALFANT VALLEY/APN 26-210-37

INTRODUCTION

This noise impact analysis has been prepared to evaluate the potential noise impacts and mitigation measures associated with residential development at APN 26-210-37/Chalfant Valley, in Mono County, California. This report is intended to satisfy the County's requirement for a project-specific noise impact analysis by examining the impacts of the proposed noise-sensitive uses on the project site and evaluating the mitigation measures incorporated as part of the project design.

Project Description

Figure 1 illustrates the location of the proposed project. Figure 2 illustrates the project's site plan. The project site is located in Chalfant Valley area of Mono County and is generally bounded by Highway 6 and a frontage road on the east, Chalfant Road on the south, a Los Angeles Department of Water and Power (LADWP) easement on the west, and vacant land to the north. There is a 2.22-acre area of land planned for commercial development to the east of the southern part of the project site west of Highway 6.

The proposed plan includes development of 48 dwelling units. As this plan illustrates, direct access to the proposed development site will be via access roads from Highway 6 and Chalfant Road.

Methodology Related to Noise Impact Assessment

Evaluation of noise impacts associated with a proposed residential project typically includes the following:

- Determine the noise impacts associated with short-term construction of the proposed project on adjacent uses;
- Determine the long-term traffic noise impacts on on-site noise-sensitive uses; and
- Determine the required mitigation measures to reduce short-term and long-term noise impacts.

Characteristics of Sound

Sound is increasing to such disagreeable levels in our environment that it can threaten our quality of life. Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

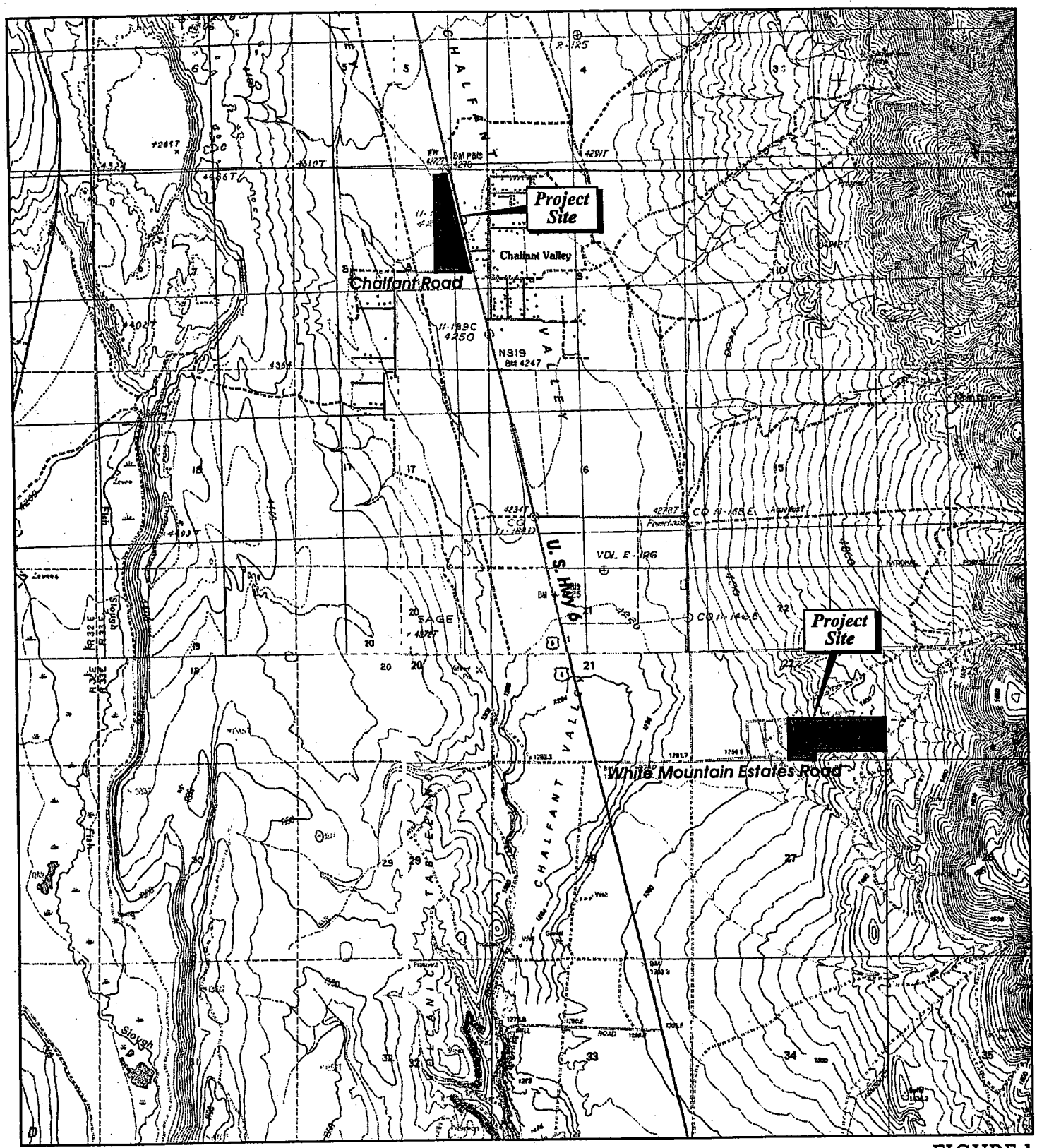

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FIGURE 1

N

Highway 6
Vicinity Map

SOURCE: USGS 1:100,000 QUAD - BISHOP, CA.

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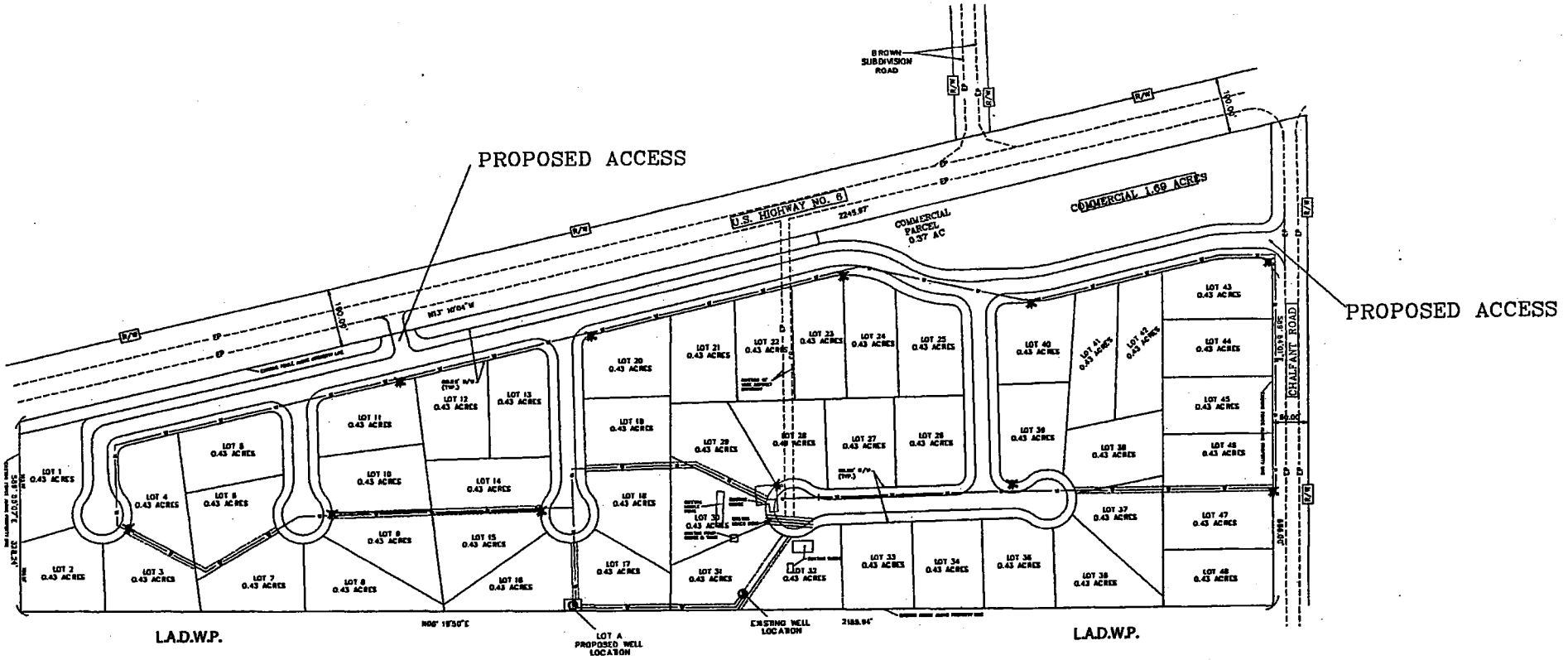

FIGURE 2

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N

0 140 280
FEET

Highway 6
Brown Property Site Plan

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To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect our ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a wave resulting in the tone's range from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves, combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent sensitive land uses.

Measurement of Sound

Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units, such as inches or pounds, decibels are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 decibels (dB) are 10 times more intense than one decibel, 20 decibels are 100 times more intense, and 30 decibels are 1,000 times more intense. Thirty decibels represent 1,000 times as much acoustic energy as one decibel. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than zero decibels. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10-decibel increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source, such as highway traffic or railroad operations, the sound decreases 3 dB for each doubling of distance in a hard site environment. Line source, noise in a relatively flat environment with absorptive vegetation, decreases 4.5 dB for each doubling of distance.

Noise can be rated in many ways for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and community noise equivalent level (CNEL) or the day-night average level (L_{dn}) based on A-weighted decibels (dBA). CNEL is the time varying noise over a 24-hour period, with a five dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale, but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within one dBA of each other and are normally exchangeable. Mono County uses the CNEL noise scale for long-term noise impact assessment.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max}, which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. This measure is often used together with another noise scale, or noise standards in terms of percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time the noise level exceeds this median level, and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

Noise impacts can be described into three categories as follows: (1) Audible impacts that refer to increases in noise levels noticeable to humans generally refer to a change of 3.0 dB or greater, since this level has been found to be barely perceptible in exterior environments. (2) Potentially audible refers to a change in the noise level between 1.0 and 3.0 dB, a range of noise levels found to be noticeable only in laboratory environments. (3) Changes in noise level of less than 1.0 dB are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 decibels, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 decibels, the tickling sensation is replaced by the feeling of pain in the ear, which is called the threshold of pain. A sound level of 190 decibels will rupture the eardrum and permanently damage the inner ear. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less developed areas.

Table A lists "Definitions of Acoustical Terms," and Table B shows "Common Sound Levels and Their Sources." Table C shows "Land Use Compatibility for Exterior Community Use" recommended by the California Department of Health, Office of Noise Control.

Table A: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of level that denotes the ratio between two quantities proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour, A-weighted average sound level from midnight to midnight, obtained after the addition of five decibels to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 decibels to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The 24-hour, A-weighted average sound level from midnight to midnight, obtained after the addition of 10 decibels to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control 1991.

Table B: Common Sound Levels and Their Noise Sources

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Evaluations
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle at a few feet away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	
Near Freeway Auto Traffic	70	Moderately Loud	Reference Level
Average Office	60	Quiet	½ as loud
Suburban Street	55	Quiet	
Light Traffic; Soft Radio Music in Apartment	50	Quiet	¼ as loud
Large Transformer	45	Quiet	
Average Residence Without Stereo Playing	40	Faint	⅛ as loud
Soft Whisper	30	Faint	
Rustling Leaves	20	Very Faint	
Human Breathing	10	Very Faint	Threshold of Hearing
	0	Very Faint	

Source: Compiled by LSA Associates, Inc. 2003.

Table C: Land Use Compatibility for Exterior Community Noise

Land Use Category	Noise Range (L_{dn} or CNEL), dB			
	I	II	III	IV
Passively used open spaces	50	50–55	55–70	70+
Auditoriums, concert halls, amphitheaters	45–50	50–65	65–70	70+
Residential: low density single family, duplex, mobile homes	50–55	55–70	70–75	75+
Residential: multifamily	50–60	60–70	70–75	75+
Transient lodging: motels, hotels	50–60	60–70	70–80	80+
Schools, libraries, churches, hospitals, nursing homes	50–60	60–70	70–80	80+
Actively used open spaces: playgrounds, neighborhood parks	50–67	—	67–73	73+
Golf courses, riding stables, water recreation, cemeteries	50–70	—	70–80	80+
Office buildings, business commercial and professional	50–67	67–75	75+	—
Industrial, manufacturing, utilities, agriculture	50–70	70–75	75+	—

Noise Range I—Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Noise Range II—Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.

Noise Range III—Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Noise Range IV—Clearly Unacceptable: New construction or development should generally not be undertaken.

Source: Office of Noise Control, California Department of Health 1976.

EXISTING CONDITIONS

Sensitive Land Uses in the Project Vicinity

There are existing residential uses within the Brown Subdivision located to the east of the project site. These sensitive uses would be potentially affected by the proposed project during construction.

Overview of the Existing Noise Environment

The primary existing noise sources in the project area are transportation facilities. Traffic on Highway 6, Chalfant Road, and Brown Subdivision Road is the dominant source of ambient noise.

Thresholds of Significance

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located. The applicable noise standards governing the project site are the County's noise criteria.

Mono County Noise Standards. In the County's Noise Element of the General Plan (Mono County 1993), the County stated, "State law also requires the noise element to include implementation measures and possible solutions that address existing and foreseeable noise problems. The adopted noise element also serves as a guideline for compliance with the State's insulation standards. These standards specify required levels of outdoor to indoor noise reduction for new multi-family residential construction in areas where the outdoor noise exposure exceeds CNEL (or L_{dn}) 60 dBA."

However, the County's Noise Element does not specify a noise standard for outdoor living areas associated with residential uses, such as backyards or side yards. Front yards or driveways are not considered noise sensitive. The State guidelines indicate that residential uses are normally acceptable in exterior noise environments up to 60 dBA CNEL and conditionally acceptable in exterior noise environments up to 70 dBA CNEL (when adequate building insulation would provide sufficient noise attenuation to meet the 45 dBA CNEL interior noise standard). For planning purposes, the 65 dBA CNEL is considered by many local jurisdictions as the exterior noise standard for transportation-related noise impacts.

IMPACTS AND MITIGATION MEASURES

Short-Term Construction-Related Impacts

Noise levels from grading and other construction activities for the proposed project may range up to 85 dBA at the closest residences east of the project site for very limited times when construction occurs near the project's boundary. Construction-related noise impacts from the proposed project would be potentially adverse; however, compliance with the County's construction hours requirement would reduce the impact to a less than significant level.

Short-term noise impacts would be associated with excavation, grading, and erecting of buildings on site during construction of the proposed project. Construction-related short-term noise levels would be higher than existing ambient noise levels in the project area today, but would no longer occur once construction of the project is completed.

Two types of short-term noise impacts could occur during the construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the site for the proposed project would incrementally increase noise levels on access roads leading to the site. Although a relatively high single event noise exposure potential would cause intermittent noise nuisance (passing trucks at 50 feet would generate up to a maximum of 87 dBA), the effect on longer term (hourly or daily) ambient noise levels would be small. Therefore, short-term construction-related impacts associated with worker commute and equipment transport to the project site would be less than significant.

The second type of short-term noise impact is related to noise generated during excavation, grading, and building erection on the project site. Construction is completed in discrete steps, each of which has its own mix of equipment, and consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the site, and therefore, the noise levels surrounding the site as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table D lists typical construction equipment noise levels recommended for noise-impact assessments, based on a distance of 50 feet between the equipment and a noise receptor. Typical noise levels range up to 91 dBA L_{max} at 50 feet during the noisiest construction phases. The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels, because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as backfillers, bulldozers, draglines, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve one or two minutes of full-power operation followed by three to four minutes at lower power settings.

Construction of the proposed project is expected to require the use of earthmovers, bulldozers, and water and pickup trucks. This equipment would be used on the project site. Based on the information in Table D, the maximum noise level generated by each earthmover on the proposed project site is assumed to be 88 dBA L_{max} at 50 feet from the earthmover. Each bulldozer would also generate 88 dBA L_{max} at 50 feet. The maximum noise level generated by water and pickup trucks is approximately 86 dBA L_{max} at 50 feet from these vehicles. Each doubling of the sound sources with equal strength increases the noise level by three dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, the worst-case combined noise level during this phase of construction would be 91 dBA L_{max} at a distance of 50 feet from the active construction area.

The nearest receptor location to the project site is the existing residential uses approximately 100 feet to the east of the project site. The residential uses to the east of the project site would potentially be exposed to intermittently high noise reaching 85 dBA L_{max}. Compliance with the construction hours specified in the County's noise ordinance would reduce the construction noise impacts to less than significant.

Table D: Typical Construction Equipment Noise Levels before and after Mitigation

Type of Equipment	Range of Maximum Sound Levels Measured (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers, 12,000 to 18,000 ft-lb/blow	81–96	93
Rock Drills	83–99	96
Jackhammers	75–85	82
Pneumatic Tools	78–88	85
Pumps	74–84	80
Dozers	77–90	85
Tractors	77–82	80
Scrapers	83–91	87
Haul Trucks	83–94	88
Cranes	79–86	82
Portable Generators	71–87	80
Rollers	75–82	80
Front-End Loaders	77–90	86
Hydraulic Backhoe	81–90	86
Hydraulic Excavators	81–90	86
Graders	79–89	86
Air Compressors	76–89	86
Trucks	81–87	86

Source: Noise Control for Buildings and Manufacturing Plants, Bolt, Beranek & Newman, 1987.

Long-Term Traffic Noise Impacts

Project-related, long-term vehicular trip increases are anticipated to be moderate. However, proposed on-site residential uses would be potentially exposed to traffic noise levels exceeding the exterior noise standard of 65 dBA CNEL and/or the interior noise standard of 45 dBA CNEL. Mitigation measures would be required.

It takes doubling of the traffic volume to have a three-decibel increase in traffic noise. Vehicular traffic trips associated with the proposed project would not result in significant traffic noise impacts on off-site sensitive uses. However, as shown in Figure 2, the proposed residential units near Highway 6 will be potentially exposed to significant traffic noise from Highway 6. Traffic on other streets in the project vicinity would not result in any noise impact on the proposed residential uses.

The FHWA highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate highway traffic-related noise conditions along Highway 6 in the project vicinity. The noise impact analysis was conducted using the vehicle mix and traffic volume on Highway 6 in the project vicinity, obtained from 2001 Annual Average Daily Truck Traffic on the California Highway System (Caltrans 2001), projected to year 2020 with a 3 percent annual growth rate (Caltrans Route 6, Route Concept Report, District 9, 1991) plus the 288 daily trips associated with the proposed project (assuming 6 trips per day for each dwelling unit proposed). Four vehicle speeds were modeled for potential traffic noise impacts. As a worst-case scenario, noise levels under the highest vehicle speed, 65 dBA CNEL, are used for impact analysis and mitigation recommendations. The modeled 24-hour CNEL levels are shown in Table E.

Table E provides the traffic noise levels along Highway 6 adjacent to the project site under the year 2020 buildout scenario. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between the traffic and the location where the noise contours are drawn. The specific assumptions used in developing these noise levels and model printouts are provided in Appendix A.

Table E: Vehicular Traffic Noise along Highway 6 in the Project Vicinity

Scenario	ADT	Centerline to 70 dBA CNEL (feet)	Centerline to 65 dBA CNEL (feet)	Centerline to 60 dBA CNEL (feet)	CNEL (dBA) 50 Feet from Outermost Lane
Year 2020 (65 mph)	3,448	78	167	359	72.1
Year 2020 (60 mph)	3,448	71	152	327	71.5
Year 2020 (55 mph)	3,448	64	138	296	70.9
Year 2020 (50 mph)	3,448	58	123	266	70.2

Source: LSA Associates, Inc., March 2004.

Proposed dwelling units adjacent to Highway 6 have their property line from 70 to 280 feet from the roadway centerline and therefore are within the 60 dBA CNEL impact zone, where the 60 dBA CNEL contours extend to 359 feet from the roadway centerline.

Based on the project's preliminary site plan, home lots along Highway 6 have their property line shown with the distance to the roadway centerline (with respective traffic noise level shown in parentheses) and their respective use (shortest distance is used for each lot).

Lot 1: 70 feet (71 dBA CNEL), Side Yard
Lot 4: 130 feet (67 dBA CNEL), Side Yard
Lot 5: 130 feet (67 dBA CNEL), Side Yard
Lot 11: 130 feet (67 dBA CNEL), Side Yard
Lot 12: 130 feet (67 dBA CNEL), Front Yard
Lot 13: 130 feet (67 dBA CNEL), Side Yard
Lot 20: 130 feet (67 dBA CNEL), Side Yard
Lot 21: 130 feet (67 dBA CNEL), Front Yard
Lot 22: 130 feet (67 dBA CNEL), Front Yard
Lot 23: 130 feet (67 dBA CNEL), Front Yard
Lot 24: 130 feet (67 dBA CNEL), Front Yard
Lot 25: 180 feet (64 dBA CNEL), Side Yard
Lot 40: 250 feet (62 dBA CNEL), Side Yard
Lot 41: 260 feet (62 dBA CNEL), Front Yard
Lot 42: 260 feet (62 dBA CNEL), Front Yard
Lot 43: 260 feet (62 dBA CNEL), Side Yard

Exterior Noise Mitigation. Based on the above distance information, the following home lots along Highway 6 may need a six-foot sound wall to reduce traffic noise to below 65 dBA CNEL for their outdoor active use areas: Lots 4, 5, 11, 13, and 20.

Lot 1 would need an eight-foot sound wall along its northern and eastern property line adjacent to Highway 6 to protect its side yard and backyard.

The sound walls recommended above can be combination of earthen berm and concrete masonry unit (CMU) as long as the effective height meets the minimum height recommended. If the layout for these lots places the front yard between the house and Highway 6, no sound wall would be required for the exterior noise.

The following home lots do not require sound wall mitigation because the areas directly adjacent to Highway 6 are front yards or driveways and are not considered noise sensitive: Lots 12 and 21–24.

The following home lots would not be impacted by traffic noise exceeding the 65 dBA CNEL threshold, and no sound wall is required for their outdoor living areas: Lots 25 and 40–43.

Interior Noise Mitigation. Typical sound-level reduction of buildings in a warm climate such as Central California is 12 dBA with windows open and 24 dBA with windows closed (Protective Noise Levels, EPA 550/9-79-100, November 1978). With windows closed, interior noise levels at the dwelling units exposed to traffic noise 69 dBA CNEL or lower, such as most of the home lots adjacent to Highway 6 (except Lot 1), would be reduced to 45 dBA CNEL or lower. This range of noise levels is lower than the 45 dBA CNEL interior noise standard identified by the State and Mono County. Therefore, no building facade upgrades, such as double-paned windows with sound transmission class (STC) ratings higher than standard construction, are required. Depending on the building setback for the residential structure on Lot 1, building facade enhancement may be required. If the building setback is more than 21 feet from the eastern property line (or more than 91 feet from the centerline of Highway 6), no building facade enhancement is needed. However, if the building

setback is less than 91 feet from the centerline of Highway 6, double-paned windows with a minimum rating of STC-30 would be required.

With windows open, the interior noise level would be higher than 45 dBA CNEL for all frontline home lots (those with a building setback less than 569 feet from the centerline of Highway 6). A form of mechanical ventilation would be required for all frontline units along Highway 6. With the six- to eight-foot sound walls implemented, ground-floor bedrooms would receive 5 to 7 dBA in noise reduction, respectively, in addition to the 12 to 24 dBA building exterior-to-interior noise attenuation.

Mitigation Measures

Construction Impacts. Construction of the proposed project would potentially result in relatively high noise levels and annoyance at the closest residences. The following measures would reduce short-term construction-related noise impacts resulting from the proposed project:

1. During all project site excavation and grading on site, the project contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.
2. The project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.
3. The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.
4. During all project site construction, the construction contractor shall limit all construction-related activities that would result in high noise levels to between the hours of 6:00 a.m. to 8:00 p.m. on weekdays and between the hours of 7:00 a.m. to 8:00 p.m. on weekends and holidays, unless written approval is obtained from Mono County building official.

Traffic Noise Impacts. The following mitigation measures shall be implemented for the proposed project:

1. A form of mechanical ventilation for all frontline units facing traffic from Highway 6, including Lots 1, 4, 5, 11–13, 20–25, and 40–43.
2. A six-foot sound wall along the project's eastern property line for Lots 4, 5, 11, 13, and 20. The sound wall can be a combination of earthen berm and CMU.
3. An eight-foot sound wall along the project's northern and eastern property line for Lot 1. The sound wall can be a combination of earthen berm and CMU.
4. If the building setback on Lot 1 is less than 21 feet from the eastern property line or less than 91 feet from the centerline of Highway 6, double-paned windows with a minimum rating of STC-30 would be required for bedroom windows directly exposed to Highway 6 traffic.

Level of Significance after Mitigation

With implementation of the identified mitigation measures, potential short-term and long-term noise impacts would be reduced to below the level of significance.

REFERENCES

Bolt, Beranek & Newman. 1987. Noise Control for Buildings and Manufacturing Plants.

Mono County. 1993. Noise Element of the General Plan.

Environmental Protection Agency. 1978. Protective Noise Levels, EPA 550/9-79-100.

Federal Highway Administration. 1977. Highway Traffic Noise Prediction Model, FHWA RD-77-108.

APPENDIX A

FHWA TRAFFIC NOISE MODEL PRINTOUTS

TABLE DFD430
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3/24/04
ROADWAY SEGMENT: HWY 8 AT PROJECT SITE
NOTES: FUTURE (2020) TRAFFIC NOISE

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 3448 SPEED (MPH): 65 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	60.46	10.06	7.48
M-TRUCKS	3.92	0.23	0.47
H-TRUCKS	15.03	0.47	1.88

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 72.14

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
77.6	166.7	358.9	773.0

TABLE DFD430A
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3/24/04
ROADWAY SEGMENT: HWY 8 AT PROJECT SITE
NOTES: FUTURE (2020) TRAFFIC NOISE

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 3448 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

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ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.54

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
70.7	151.9	327.0	704.3

TABLE DFD430B
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3/24/04
ROADWAY SEGMENT: HWY 8 AT PROJECT SITE
NOTES: FUTURE (2020) TRAFFIC NOISE

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 3448 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	60.46	10.06	7.48
M-TRUCKS	3.92	0.23	0.47
H-TRUCKS	15.03	0.47	1.88

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.89

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
64.1	137.5	295.9	637.4

TABLE DFD430C
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 3/24/04
ROADWAY SEGMENT: HWY 8 AT PROJECT SITE
NOTES: FUTURE (2020) TRAFFIC NOISE

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 3448 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	60.46	10.06	7.48
M-TRUCKS	3.92	0.23	0.47
H-TRUCKS	15.03	0.47	1.88

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.18

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
57.6	123.4	265.7	572.1
